

### **REMARKS**

Reconsideration of the application is respectfully requested.

Claims 1-11, 13, 16, 18-20, and 22 are pending. Claims 12, 14, 15, 17, and 21 have been previously cancelled.

### **CLAIM REJECTIONS UNDER 35 USC § 103**

Claims 1, 5, 8-9, 13, 18, and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,672,800 to Mathys *et al.* (herein "Mathys"), in view of U.S. Patent No. 4,150,062 to Garwood *et al.* (herein "Garwood") for the reasons stated on pages 4-8 of the Action. Applicants respectfully disagree.

Mathys teaches away from the subject claims as it fails to appreciate that variable water concentration as claimed provides additional benefits. Additionally, Applicants agree with the Examiner's statement appearing in the Action on page 3 (reproduced below).

Applicants argue that **WO 93/16020** exemplifies and suggests feeding water into the oligomerization process at or close to fixed rates within specific ranges through-out a reactor run. Thus, neither **Cavani** nor **WO 93/16020** disclose or suggest the combination of specific ranges for the water content in the initial phase and latter phases of the process. This argument is considered persuasive, therefore, the previous rejections of claims 1-11, 13, 16, and 18-20 under 35 USC 103(a) are withdrawn.<sup>1</sup>

To cure these deficiencies, the Action references the teachings of Garwood. However, Garwood primarily suggests ranges that lie outside the subject claims, essentially teaching a skilled artisan to employ massive amounts of water as compared to the olefin feed in

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<sup>1</sup> U.S. Patent No. 5,672,800 is a national filing of WO 93/16020 and both are to Mathys and claim the benefit of priority to the same document, EP 92300797, filed January 30, 1992.

the oligomerization process. For example, Example 5 has 8% propylene, 12% butylene, and 80% propane (Garwood at col. 16, lines 14-15). This stream has a mol ratio of water to olefin in the range 2.7 to 4.1 (Garwood at col. 16, lines 39-40). Even at the lowest weight percent of water in the combined hydrocarbon/water stream, the water is much greater than the amount of olefin. Indeed, the amounts of water used by Garwood are at least four orders of magnitude higher than the ranges as recited in the claims. Thus, Garwood teaches that massive amounts of water are required as shown in the examples having 16 wt% water in the feed.

In contrast, Applicants claim among other things, processes that employ *a water content of from 450 to 800 wt ppm during the initial phase of the process of conversion and the latter phase is from 250 to 400 wt ppm*. Such a claim element is not recognized by Garwood as a result-effective variable and is the result of more than process optimization. M.P.E.P. § 2144.05 II. B. ("A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.") In particular, for zeolite oligomerization, the start-up activity of the catalyst is inherent in the fresh catalyst. Without being bound to theory, the smaller amounts of water added as recited in the claims acts as a moderator to lower the activity of the catalyst by titrating some of the acid sites. Using the massive amounts of water as taught by Garwood would most likely titrate too many acid sites and depress the catalyst activity to a commercially unacceptable low level. Once that initial start-up activity has been lost by coking the most active sites, the water may be reduced to lower the degree of moderation and allow more active sites for oligomerization. No such teaching or suggestion may be found by the combination of Mathys and Garwood. In fact, Mathys suggests using virtually a fixed rate water feed and Garwood suggests using massive amounts of water. As such, Applicants respectfully submit that the subject claims are not *prima facie* obvious over the references of record and request that the rejection be withdrawn.

Claims 2-3 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Mathys, in view of Garwood, as applied to claim 1 above, and further in view of Edgar, *et al.* ("Process Control" in Perry's Chemical Engineer's Handbook, J. Wiley & Sons, D.W. Perry and R.H. Green, eds., 7<sup>th</sup> ed., 1997) (herein "Edgar") for the reasons stated on pages 8-10 of the

Action. Applicants respectfully disagree and submit that since the subject claims are all dependent claims, they are patentable for at least the reasons relied upon as stated for their underlying, independent claim. (MPEP § 2143.03) (If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious.) (citation omitted.) Withdrawal of the rejection is respectfully requested.

Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Mathys, in view of Garwood, and further in view of Edgar, as applied to claim 3 above, and further in view of Fair *et al.* (“Gas Absorption and Gas-Liquid System Design” in Perry’s Chemical Engineer’s Handbook, J. Wiley & Sons, D.W. Perry and R.H. Green, eds., 7<sup>th</sup> ed., 1997) for the reasons stated on pages 10-11 of the Action. Applicants respectfully disagree and submit that since the subject claim is a dependent claim, it is patentable for at least the reasons relied upon as stated for its underlying, independent claim. (MPEP § 2143.03) (If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious.) (citation omitted.) Withdrawal of the rejection is respectfully requested.

Claim 7 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Mathys, in view of Garwood, and further in view of Edgar, as applied to claim 2 above, and further in view of U.S. Patent No. 4,754,096 to Chang *et al.* for the reasons stated on pages 11-12 of the Action. Applicants respectfully disagree and submit that since the subject claim is a dependent claim, it is patentable for at least the reasons relied upon as stated for its underlying, independent claim. (MPEP § 2143.03) (If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious.) (citation omitted.) Withdrawal of the rejection is respectfully requested.

Claims 10-11 and 19-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Mathys, in view of Garwood, as applied to claim 1 above, and further in view of Cavani *et al.* (“Effect of Water in the Performance of the ‘Solid Phosphoric Acid’ Catalyst for Alkylation of Benzene to Cumene and for Oligomerization of Propene”, Appl. Catal. A, 97 (1993) 177-196) for the reason stated on pages 12-13 of the Action. Applicants respectfully disagree and submit that since the subject claims are all dependent claims, they are patentable for at least the reasons relied upon as stated for their underlying, independent claim. (MPEP § 2143.03) (If an

independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious.) (citation omitted.) Withdrawal of the rejection is respectfully requested.

Claim 16 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Mathys, in view of Garwood, as applied to claim 1 above, and further in view of U.S. Patent No. 4,973,790 to Beech *et al.* for the reasons stated on pages 13-14 of the Action. Applicants respectfully disagree and submit that since the subject claim is a dependent claim, it is patentable for at least the reasons relied upon as stated for its underlying, independent claim. (MPEP § 2143.03) (If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious.) (citation omitted.) Withdrawal of the rejection is respectfully requested.

Applicants thank the Examiner for listing the references on pages 14-15 of the Action as pertinent to Applicants' disclosure. However, given that the subject references do not form a basis for a rejection of record, Applicants do not opine to their relevance nor do Applicants acquiesce to any argument of non-patentability in light of these references against any of the pending claims.

Applicants respectfully solicit a prompt notice of allowability. In the alternative, Applicants invite the Office to telephone the undersigned attorney if there are any other issues outstanding which have not been presented to the Office's satisfaction.

Respectfully submitted,

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Date

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